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REMARKS

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This application has been reviewed in light of the Office Action dated February 27, 2002. Claims 1, 7 and 13-29 are presented for examination. Claims 2-6 and 8-12 have been canceled, without prejudice or disclaimer of the subject matter presented therein. Claims 1 and 7, which are the only independent claims, have been amended to define even more clearly what Applicant regards as his invention. Favorable reconsideration is requested.

Both of independent Claims 1 and 7 were rejected under 35 U.S.C. § 102(b) as being anticipated by Japanese Publication No. 08-241976 (Hideki), and the remaining claims were all rejected under 35 U.S.C. § 103(a) in view of *Hideki* above or in combination with U.S. Patent No. 5,138,145 (Nakamura et al.).

As background, it is noted that a conventional solid-state image pickup element chip may warp due to variations in its operating temperature or heating during manufacturing, because the thermal expansion coefficient of the chip differs from that of the protection cap. Warping of the chip causes focus of the image to vary across the chip, resulting in a degraded image. Applicant's present invention avoids warping of the chip.

Claim 1 is directed to a solid-state image pickup device that includes a solid-state image pickup element chip on which solid-state image pickup elements are mounted, and a protection cap provided on a light incident side of the solid-state image pickup element chip. The protection cap is adapted to protect the solid-state image pickup element chip. In addition, the solid-state image pickup element chip is formed on a substrate having a thermal expansion coefficient substantially equal to that of the

protection cap, and the substrate and the protection cap are sealed with a resin, so as to form a structure having a hollow space between the solid-state image pickup element chip and the protection cap.

An advantage of a solid state image pickup element chip constructed according to Claim 1 is that the focal point is the same for all the pixels in the chip, because warping of the chip due to heating during the manufacturing process or changes in ambient temperature, is avoided.

The Examiner states on pages 2 and 3 of the Action that, as regards original Claims 1 and 7, *Hideki* discloses a protection cap (36) and a substrate (30) that are made of the same material. Nonetheless, Applicant has found nothing in *Hideki* that teaches that both the protection cap and substrate are made of the same material. In addition, Applicant maintains that *Hideki* does not attach any significance to or, for that matter, even discuss the thermal expansion coefficients of the substrate (30), which is described as ceramic, and of the cover (16), which is described as glass. Instead, Applicant understands *Hideki* to disclose a resin sealing method such that the inside of a resin sealing frame surrounding a CCD chip is filled with a transparent resin. The method includes two steps of heating and degassing in order to avoid forming bubbles in the resin.

Applicant notes that although *Hideki* describes materials that are presently popular for use in the protection cap and the substrate, *Hideki* is concerned with the elimination of foaming and bubbling of epoxy used to fill in the space around a CCD, because such foaming cracks the CCD resin filling and the cover glass.

Claim 1, as amended, recites that there is a hollow space between the solid-state image pickup element chip and the protection cap. Support for this feature is found, for example, in Figs. 1 and 4-7; page 4, line 23, to page 5, line 1; and page 11, lines 11-18. This is not suggested by *Hideki*. Applicant believes that filling the space between the CCD and the cover glass with transparent resin, in the manner of *Hideki*, will cause the CCD chip to warp due to the difference between the thermal expansion coefficient of the cover glass and that of the CCD. Therefore, in order to clarify this distinction between *Hideki* and Applicant's present invention, independent Claims 1 and 7 have been amended.

In short, nothing in *Hideki* teaches forming a solid-state image pickup element chip on a substrate with a thermal expansion coefficient substantially equal to that of the protection cap, as recited in Claim 1. Additionally, nothing in *Hideki* teaches forming a solid-state image pickup element chip on a substrate, so as to form a structure having a hollow space between the solid-state image pickup element chip and the protection cap, as recited in Claim 1, as amended. Accordingly, Claim 1 is patentable over *Hideki*, and is in condition for allowance.

Independent Claim 7 includes substantially the same features as discussed above in connection with Claim 1. Claim 7 recites, *inter alia*, that the substrate is made of the same material as that of the protection cap. Of course, the same materials have the same thermal expansion coefficient. It follows that materials having substantially equal thermal expansion coefficients, as recited in Claim 1, would encompass materials having the same thermal expansion coefficients, as recited in Claim 7. Thus, the foregoing feature of Claim 7 is encompassed by the similar feature of Claim 1.

Accordingly, Claim 7 is patentable over *Hideki* for at least the same reasons as discussed above in connection with Claim 1.

A review of the other art of record, including *Nakamura et al.*, has failed to reveal anything which, in Applicant's opinion, would remedy the deficiencies of the art discussed above, as a reference against the independent claims herein. Those claims are therefore believed patentable over the art of record.

The subject matter of canceled Claims 2-6 corresponds to that of new Claims 17-21. The subject matter of canceled Claims 8-12 corresponds to that of new Claims 24-28. Support for new Claims 15, 16, 22 and 23 is found in U.S. Patent No. 5,506,401 (Segawa et al.) at col. 3, lines 36-42, and col. 5, lines 41-52, which is incorporated by reference at page 1 of Applicant's specification. Further support can be found at Fig. 1 and page 6, lines 6-21 of Applicant's specification.

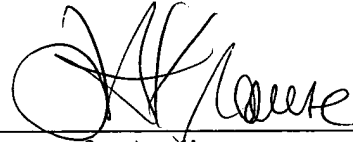
The other claims in this application are each dependent from one or the other of the independent claims discussed above and are therefore believed patentable over the cited art for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual consideration of the patentability of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicant respectfully requests favorable reconsideration and early passage to issue of the present application.

Applicant's undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

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Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE TO CLAIMS

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1. (Amended) A solid-state image pickup device comprising:

a substrate;

a solid-state image pickup element chip on which a plurality of solid-state image pickup elements are mounted, said solid-state image pickup element chip being formed on said substrate; and

a protection cap provided on a light incident side of said solid-state image pickup element chip and adapted to protect said solid-state image pickup element chip,  
[characterized in that]

wherein said [solid-state image pickup element chip is formed on a] substrate [with] has a thermal expansion coefficient substantially equal to that of said protection cap, and [the] said substrate and said protection cap are sealed with a sealing resin, so as to form a structure having a hollow space between said solid-state image pickup element chip and said protection cap.

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7. (Amended) A solid-state image pickup device comprising:

a substrate;

a solid-state image pickup element chip on which a plurality of solid-state image pickup elements are mounted, said solid-state image pickup element chip being formed on said substrate; and

a protection cap provided on a light incident side of said solid-state image pickup element chip and adapted to protect said solid-state image pickup element chip, [characterized in that]

wherein said [solid-state image pickup element chip is formed on a] substrate is made of the same material as that of said protection cap, and [the] said substrate and protection cap are sealed with a sealing resin, so as to form a substrate having a hollow space between said solid-state image pickup element chip and said protection cap.